Productivity, Stability, & Resilience of Alfalfa Cultivars in Uruguay & Argentina

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Climate change is increasing both water deficits and excesses which constrain Alfalfa (*Medicago sativa* L.) production. With the goal of assessing the stability and resilience of Alfalfa cultivars to climate extremes in South America, a database of 15.115 Alfalfa annual forage mean yields from 129 variety trials was analyzed. 12 locations from Uruguay and Argentina were included for the period 1994 – 2018. Three indexes were calculated as proposed by Picasso et al. (2019): productivity, stability and resilience. We estimated 3 resilience metrics based on the nature of the weather crisis: drought, water excess, and not water related (neutral). We estimated the correlation between these indexes and other cultivar traits (dormancy, disease and aphids' resistance). Differences were detected for productivity and stability. Resilience metrics showed non-significant variation between cultivars. The methodology applied in our data set showed limited results when used at variety level. There was a positive association between productivity and resilience metrics except for water excess resilience. When grouping varieties considering dormancy levels, we found cultivars with higher dormancy scores presented higher productivity and drought and neutral resilience indexes. Less dormant varieties (higher dormancy scores) have a substantially longer growing season in our region and they are actively growing during early spring and late fall. This would increase the possibility for them to compensate a potential dry matter shortage occurred in a critical period of time with growing in other seasons of the year. This resulting, in average, in higher annual forage yields. No association was detected between diseases and aphid resistance levels and any of the variables calculated.

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